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ABSTRACT

Two experiments were conducted to determine the relative importance of style of movement versus physical appearance in person recognition. The first study investigated the capabilities of young children and adults to recognize target individuals' styles or manners of movement and to distinguish between people when their faces were not visible. A total of 36 preschool children (ages 5 to 6 years), 36 school age children (ages 8 to 11 years), and 36 adults (ages 19 to 39 years) were given a paired-comparison recognition task involving stimuli videotaped in black and white. In the second experiment, 28 preschool children and 28 adults observed target individuals with their faces and hair visible. In both studies, targets were observed either while engaged in repetitive gross motor activity (active movement) or while being pulled back and forth on a wheeled cart (passive movement). The experiments suggest that children start out life with the capability for utilizing many sources of information as a basis for recognizing people. The young children used movement differences rather than bodily differences as a basis for recognition. By contrast, the adults gave more emphasis to physical appearance and did not make use of style of movement in identification. These developmental differences imply that adults may be likely to describe acquaintances in terms of their physical appearance, while young children may think of people in broader terms. (BJD)

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The Relative Importance of Style of Movement vs. Physical Appearance in Person Recognition[1]

Jean A. Dirks, Ph.D.

In everyday life, adults often recognize family members at a great distance by their gait, and they occasionally distinguish between athletic competitors by their style or manner of movement. For example, a woman might recognize her child at a distance by the child's manner of walking, or she might notice that an athletic competitor has a particularly distinctive kick. This ability to use information from movement patterns to recognize and distinguish between people has been studied recently by Cutting and Kozlowski and their co-workers (Cutting, 1981; Barclay, Cutting, & Kozlowski, 1978; Cutting & Kozlowski, 1977; Kozlowski & Cutting, 1977). Their research indicates that adults can use information from a person's movement patterns to identify the person's sex in a darkened setting where there is limited information about physical appearance.

The experiments which are to be described here extend this previous line of research by investigating from a developmental standpoint the relative importance of style of movement vs. physical appearance in person recognition. The questions asked here are, first, Do young subjects tend to rely only on a person's physical appearance as a basis for recognition, or do they also take into account the person's style or manner of movement as well? Secondly, are young children's perceptual skills in this regards similar to or different from those of adult viewers? In order to answer these questions, two experiments are reported here.

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[1] This paper was presented at the 50th Biennual Meeting of the Society for Research in Child Development (SRCD), held in Detroit, April 1983. Author's address: Dr. Jean A. Dirks, Southgate Regional Center for Developmental Disabilities, 16700 Pennsylvania Road, Southgate, MI 48195.

Experiment 1

The first experiment, which was conducted by myself and my co-worker Timothy Whelan at the University of Michigan, investigates whether young children and adults are capable of using style or manner of movement to recognize and distinguish between people when the target people's faces are not visible. Thirty-six pre-school children (aged 5-6 years), 36 school-age children (aged 8-11 years), and 36 young adults (aged 19-39 years) were given a paired comparison recognition task involving black and white videotaped stimuli. Each subject saw 16 pairs of videotaped events, and was asked if the two events in each pair involved the same person or a different person.

Each event was approximately 30 seconds long, and depicted a young adult who wore a black hat with black cloth facial covering that covered their face, head, and hair. The facial covering meant that this experiment was somewhat similar to previous research by Cutting and Kozlowski in dark-room settings, in that it was intended to find out if subjects used style of movement for recognition when there was reduced information about the target person's physical appearance.

In order to determine to what extent subjects in Experiment 1 were basing their recognition on information from the videotaped people's style of movement, half the videotaped pairs showed videotaped people who exhibited a repetitive gross-motor activity over and over for the 30 second segment. These were called Active Movement pairs, and the activities included bouncing a ball, or tossing a ball against a wall, or raising one's leg during leg exercises, or skipping, etc. The other half of the videotaped pairs showed videotaped people who were pulled back and forth across the taping room passively on a wheeled cart by an unseen pulley system. The people in the Passive Movement pairs faced in roughly the same orientation as the Active Movement pairs, and the props (such as balls etc.) that were used in the Active Movement pairs

were present in the foreground or background of each matched Passive Movement pair. The attached figure illustrates the Active Movement and Passive Movement versions of bouncing a ball.

The overall recognition scores in the attached graph can be interpreted by noting that the Passive Movement pairs presented information on bodily appearance, while the Active Movement pairs presented information both on bodily appearance and on the target person's idiosyncratic manner or style of movement that he/she exhibited during the active movement. Consequently, if subjects' recognition accuracy were better in the Active Movement pairs than in the matched Passive Movement pairs, then subjects would be utilizing the style of movement in order to recognize and distinguish between the target people.

The results on the left hand graph show what happened in a situation where the videotaped people within a given pair were young adults of the same sex, such as two young adult females, or two young adult males. (One third of the subjects at each age level were run in this situation.) The Active Movement recognition scores were similar to the Passive Movement recognition scores for all age groups, indicating that subjects did not benefit from the small differences in movement patterns that existed between different young adults of the same age and sex.

The results are more interesting in the central and right-hand graphs. The central graph depicts the situation where the videotaped people within a given pair were young adults of different sex (e.g. a young adult male followed by a young adult female of similar height and weight and age). The right-hand graph depicts the situation where the videotaped people within a given pair were same-sex adults of very different ages, or in other words, a young adult male or female followed by a senior citizen aged 60-78 years of the same sex.

In both the central and right-hand graphs, the 5-6 year old viewers benefited from the idiosyncratic styles of movement found in the Active Movement

pairs, since their recognition accuracy was significantly better in the Active Movement condition than in the Passive Movement condition. The 5-6 year olds' accuracy scores were no better than chance (i.e. 4 correct out of 8) in the Passive Movement condition, indicating that the young children were unable to detect and use the small differences in bodily size and shape that could be used to distinguish between people in the Passive Movement condition.

By contrast, the adult subjects did not benefit from the individualistic styles of movement that were present in the Active Movement condition, since the adults apparently had all the information they needed for accurate responding in the Passive Movement condition, where bodily size and shape were visible. Taken as a whole, the results show that the 5-6 year olds were more dependent upon style of movement information than the adults. The youngest children made use of style of movement as a basis for recognition in the two situations where style of movement differences between people were most pronounced -- that is, in the situation involving videotaped people of different sexes or of very different ages. This makes sense, since a prior ratings study had indicated that the differences between people in movement patterns and style of movement were most salient in the different sex and different age situations, and least salient in the situation where the target people were young adults of the same age and sex.

Experiment 2

Following Experiment 1, I then conducted a second experiment to determine whether young children also utilized style of movement in the more naturalistic setting where a target person's face and hair were visible. The second experiment again used a mixture of young adults and same sex senior citizens for the videotaped people, thus replicating in part the Different Age-Same Sex condition in Experiment 1. There were 28 pre-school children (aged 5-6 years), and 28 young adults who served as subjects. Half the subjects at each age level saw

8 Active Movement pairs and 8 Passive Movement pairs involving videotaped people who appeared with facial covering, and the other half of the subjects saw 8 Active Movement and 8 Passive Movement pairs involving people who appeared with uncovered face. The attached figures illustrate the different types of videotaped presentations. Remember that during Passive Movement presentations, a combination of frontal and profile orientations were usually included on most Passive Movement videotapes.

The graphed results indicate that the children's Active Movement recognition scores were significantly better than their Passive Movement recognition scores in the Covered Face condition, but not in the Uncovered Face condition. Thus, the children did benefit from and use style of movement as a basis for recognition when the target person's face was covered or not visible. However, style of movement was apparently a "less preferred" source of information than facial appearance among children, since the children did not use or benefit from style of movement when facial information was visible.

In conclusion, Experiments 1 and 2 suggest that children start out life with a capability for utilizing different sources of information as a basis for recognizing people. The children appear to use whatever differences between people are most marked or most salient. For example, in the Covered Face condition, when differences in movement pattern between people were made particularly salient by presenting a mixture of young adults and senior citizens in motion, and when bodily differences between the people were obscured through our baggy white costumes and through close matching by size and weight of target people, then the young children used movement differences rather than bodily differences as the basis for recognition.

Adults, by contrast, seemed to give more emphasis to a target person's physical appearance, even when that person had salient movement characteristics.

Thus if the adult was given a chance of using very salient movement characteristics on the one hand as a basis for recognition, or barely perceptible differences in body size and shape on the other hand, the adult still did not make much use of the style of movement characteristics.

In general, these developmental differences imply that adults may be likely to describe acquaintances in terms of their physical appearance (e.g. "the tall man with red hair"), while young children may in some circumstances think of people in broader terms, such as "the tall man with red hair who shuffles," or "the woman with curly hair who throws the ball very fast during gym class and who walks with small quick steps."

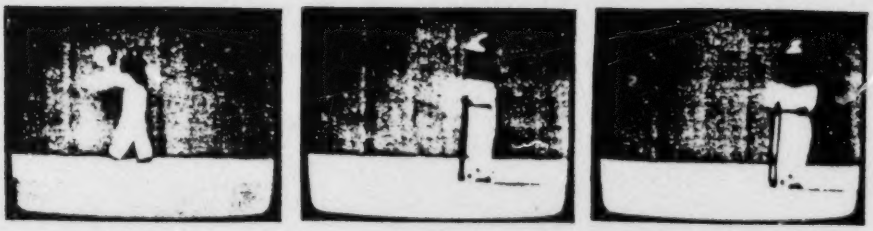
Barclay, C. D., Cutting, J. E., & Kozlowski, L. T. Temporal and spatial factors in gait perception that influence gender recognition. Perception and Psychophysics, 1978, 23(2), 145-152.

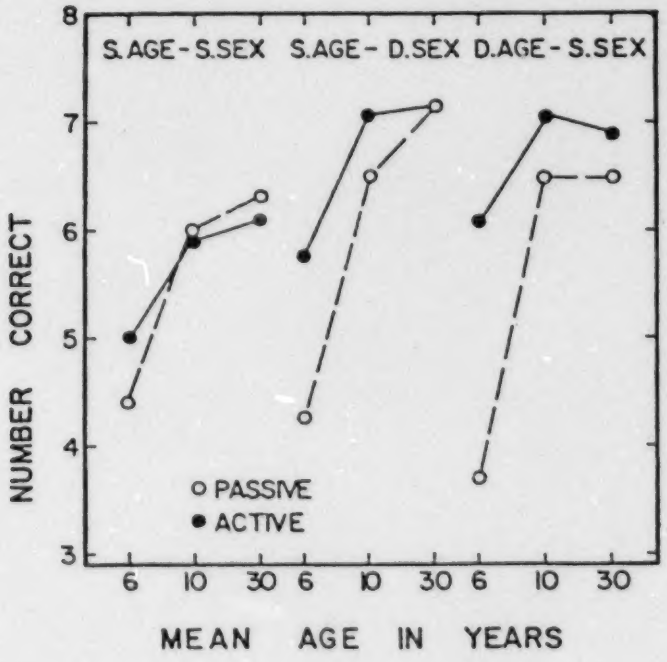
Cutting, J. E. Coding theory adapted to gait perception. Journal of Experimental Psychology: Human Perception and Performance, 1981, 7(1), 71-87.

Cutting, J. E., & Kozlowski, L. T. Recognizing friends by their walk: Gait perception without familiarity cues. Bulletin of the Psychonomic Society, 1977, 9, 353-356.

Kozlowski, L. T., & Cutting, J. E. Recognizing the sex of a walker from a dynamic point-light display. Perception and Psychophysics, 1977, 21(6), 575-580.

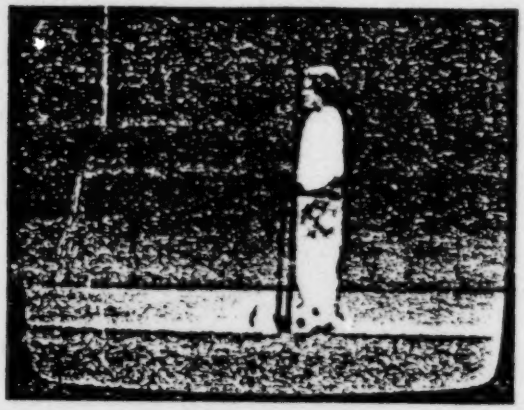
Experiment 1:





Experiment 2:

UNCOVERED FACE-PASSIVE MOVEMENT



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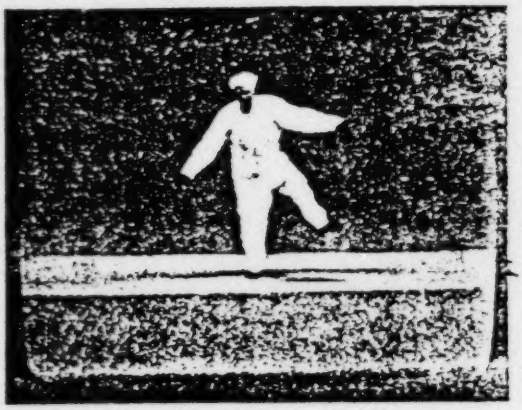

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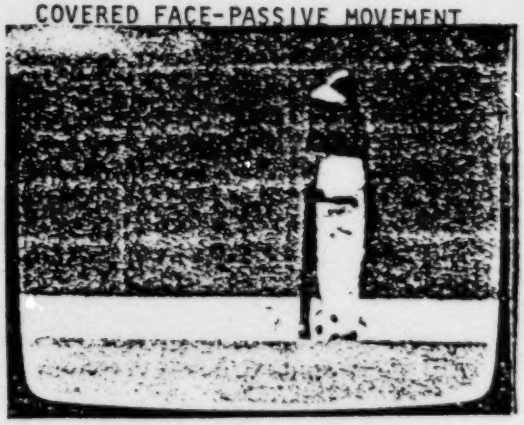

COVERED FACE-ACTIVE MOVEMENT